

# DEPARTMENT OF CONSUMER & INDUSTRY SERVICES

## DIRECTOR'S OFFICE

### GENERAL INDUSTRY SAFETY STANDARDS

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(By authority conferred on the director of consumer and industry services by sections 16 and 21 of Act No. 154 of the Public Acts of 1974, as amended, and Executive Reorganization Order No. 1996-2, being §§408.1016, 408.1021, and 445.2001 of the Michigan Compiled Laws)

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## PART 40. ELECTRICAL SAFETY-RELATED WORK PRACTICES

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## GENERAL PROVISIONS

### **R 408.14001. Scope.**

**Rule 4001.** (1) The provisions of these rules regulate electrical safety-related work practices for both qualified persons, that is, those who have training in avoiding the electrical hazards of working on or near exposed energized parts, and unqualified persons, that is, those who have little or no such training, who work on, near, or with any of the following installations:

- (a) Installations of electric conductors and equipment within or on buildings or other structures and on other premises such as yards; carnival, parking, and other lots, and industrial substations.
- (b) Installations of conductors that connect to the supply of electricity.
- (c) Installations of other outside conductors on the premises.
- (d) Installations of optical fiber cable where such installations are made together with electric conductors.

See R 408.14002 for training requirements that apply to qualified and unqualified persons.

(2) The provisions of these rules also regulate work that is performed by unqualified persons on, near, or with the installations listed in subrule (3) (a) to (d) of this rule.

(3) The provisions of these rules do not apply to work that is performed by qualified persons on, or directly associated with, any of the following installations:

- (a) Installations for the generation, control, transformation, transmission, and distribution of electric energy, including communication and metering, that are located in buildings used for such purposes or located outdoors. Work on, or directly associated with, installations of utilization equipment that is used for a

purpose other than generating, transmitting, or distributing electric energy, such as installations which are in office buildings, warehouses, garages, machine shops, or recreational buildings or which are other utilization installations that are not an integral part of a generating installation, substation, or control center, is regulated pursuant to the provisions of subrule (1) (a) of this rule. Work on, or directly associated with, generation, transmission, or distribution installations includes any of the following:

- (i) Work performed directly on such installations, such as repairing overhead or underground distribution lines or repairing a feed-water pump for the boiler in a generating plant.
- (ii) Work that is directly associated with such installations, such as line-clearance tree trimming and replacing utility poles.
- (iii) Work on electric utilization circuits in a generating plant provided if both of the following provisions apply:
  - (a) Such circuits are commingled with installations of power generation equipment or circuits.
  - (b) The generation equipment or circuits present greater electrical hazards than those posed by the utilization equipment or circuits, such as exposure to higher voltages or lack of overcurrent protection.
- (b) Installations of communication equipment to the extent that the work is regulated by the provisions of 29 C.F.R. §1910.268 which is adopted by reference in these rules and which is available at a cost as of the time of adoption of these rules of \$24.00, by ordering Title 29, Parts 1900 to 1910 – Part 1, Safety Standards, #869-011-00109-2, from the Superintendent of Documents, Congressional Sales Office, United States Government Printing Office, Washington, DC 20402, or from the Safety Standards Division, Michigan Department of Consumer and Industry Services, Box 30643, Lansing, Michigan 48909.
- (c) Installations in ships, watercraft, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles.
- (d) Installations of railways for the generation, transformation, transmission, or distribution of power that is used exclusively for operating rolling stock or installations of railways used exclusively for signaling and communication purposes.

**R 408.14002. Training requirements.**

**Rule 4002.** (1) The training requirements contained in this rule apply to employees who face a risk of electric shock that is not reduced to a safe level by the electrical installation requirements of 29 C.F.R. §§1910.303 to 1910.308, which are adopted by reference in these rules and which are available at a cost as of the time of adoption of these rules of \$24.00, by ordering Title 29, Parts 1900 to 1910 – Part 1, Safety Standards, #869-011-00109-2, from the Superintendent of Documents, Congressional Sales Office, United States Government Printing Office, Washington, DC 20402, or from the Safety Standards Division, Michigan Department of Consumer and Industry Services, Box 30643, Lansing, Michigan 48909.

(2) Employees who are in occupations that are listed in table 1 face such a risk of electric shock and are required to be trained. Other employees who also may reasonably be expected to face a comparable risk of injury due to electrical shock or other electrical hazards shall also be trained.

(3) Employees shall be trained in, and familiar with, the safety-related work practices required by these rules that pertain to their respective job assignments.

(4) Employees who are regulated by the provisions of subrules (1) to (3) of this rule, but who are not qualified persons, shall also be trained in, and familiar with, any electrically related safety practices which are not specifically addressed by these rules, but which are necessary for employee safety.

(5) Qualified persons, that is, those who are permitted to work on or near exposed energized parts, shall, at a minimum, be trained in, and familiar with, all of the following:

- (a) The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.
- (b) The skills and techniques necessary to determine the nominal voltage of exposed live parts.
- (c) The clearance distances specified in R 408.14005 and the corresponding voltages to which the person will be exposed.

For the purpose of these rules, a person shall have the training that is required by the provisions of this subrule to be considered a qualified person. Qualified persons whose work on energized equipment involves either direct contact or contact by means of tools or materials shall also have the training that is needed to meet the requirements of R 408.14005(2).

(6) The training that is required by this rule shall be classroom or on-the-job training. The degree of training provided shall be determined by the risk to the employee.

(7) Table 1 reads as follows:

**Table 1**  
**Typical Occupational Categories of Employees Who Face a**  
**Higher Than Normal Risk of Electrical Accident**

**OCCUPATION**

Blue collar supervisors\*  
Electrical and electronic engineers\*  
Electrical and electronic equipment assemblers\*  
Electrical and electronic technicians\*  
Electricians  
Industrial machine operators\*  
Material handling equipment operators\*  
Mechanics and repairers\*  
Painters\*  
Riggers and roustabouts\*  
Stationary engineers\*  
Welders

\*Workers in these groups do not need to be trained if their work or the work of those they supervise does not bring them or the employees they supervise close enough to exposed parts of electric circuits that operate at 50 volts or more to ground for a hazard to exist.

**R 408.14003. Selection and use of work practices.**

**Rule 4003.** (1) When work is performed near or on equipment or circuits which are or may be energized, safety-related work practices shall be employed to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts. The specific safety-related work practices shall be consistent with the nature and extent of the associated electrical hazards.

(2) Live parts to which an employee may be exposed shall be de-energized before the employee works on or near them, unless the employer can demonstrate that de-energizing the parts introduces additional or increased hazards or is infeasible due to equipment design or operational limitations. Live parts that operate at less than 50 volts to ground need not be de-energized if there will be no increased exposure to electrical burns or to explosion due to electric arcs. Examples of increased or additional hazards include the interruption of life-support equipment, the deactivation of emergency alarm systems, the shutdown of hazardous location ventilation equipment, or the removal of illumination for an area. Examples of work that may be performed on or near energized circuit parts because of infeasibility due to equipment design or operational limitations include the testing of electric circuits that can only be performed with the circuit energized and work on circuits that form an integral part of a continuous industrial process that would otherwise need to be completely shut down to permit work on 1 circuit or piece of equipment. Work on or near de-energized parts is regulated pursuant to the provisions of R 408.14004.

(3) If the exposed live parts are not de-energized, for example, for reasons of increased or additional hazards or infeasibility, other safety-related work practices shall be used to protect employees who may be exposed to the electrical hazards involved. Such work practices shall protect an employee from direct contact between energized circuit parts and any part of his or her body and from indirect contact through some other conductive object. The work practices that are used shall be suitable for the conditions under which the work is to be performed and for the voltage level of the exposed electric conductors or circuit parts. Specific work practice requirements are detailed in R 408.14005.

**R 408.14004 Working on or near exposed de-energized parts.**

**Rule 4004.** (1) This rule applies to work on exposed de-energized parts and to work that is near enough to exposed de-energized parts to expose an employee to any electrical hazard the parts present. Conductors and parts of electric equipment that have been de-energized, but have not been locked out in accordance with the provisions of subrule (2) of this rule, shall be treated as energized parts and the provisions of R 408.14005 apply to work on or near such parts.

(2) While any employee is exposed to contact with parts of fixed electrical equipment or circuits which have been de-energized, the circuits energizing the parts shall be locked out in accordance with the requirements of this rule. The requirements shall be followed in the order in which they are presented. As used in this section, "fixed electrical equipment" means equipment that is fastened in place or connected by permanent wiring methods. Lockout procedures that comply with current lockout requirements will also be deemed to comply with the requirements of this rule. Where lockout is required by this part, if a lock cannot be employed or if the employer can demonstrate that tagging procedures will provide safety equivalent to a lock, a tag may be used without a lock. In such cases a tag shall be in compliance with all of the following requirements:

- (a) A tag shall be of a distinctive employer design that clearly prohibits unauthorized energizing of the circuits and removal of the tag.

- (b) A tag shall not be used without an additional safety measure, such as the removal of an isolating circuit element, the blocking of a controlling switch, or the opening of an extra disconnecting device.
- (c) All persons who have access to controlling devices shall be trained in, and familiar with, the employer's tagging procedures.
- (d) Meet the requirements of general industry safety standard Part 37. Accident Prevention Signs and Tags, being R 408.13701 et seq., of the Michigan Administrative Code.

(3) An employer shall maintain a copy of the procedures outlined in subrule (2) of this rule and shall make it available for inspection by employees and by the director of the Michigan department of consumer and industry services and his or her authorized representatives. The written procedures may be in the form of a copy of the provisions of subrule (2) of this rule.

(4) Safe procedures for de-energizing circuits and equipment shall be determined before circuits or equipment are de-energized.

(5) The circuits and equipment to be worked on shall be disconnected from all electric energy sources. Control circuit devices, such as push buttons, selector switches, and interlocks, shall not be used as the sole means for de-energizing circuits or equipment. Interlocks for electric equipment shall not be used as a substitute for lockout.

(6) Stored electric energy which might endanger personnel shall be released. Capacitors shall be discharged and high-capacitance elements shall be short-circuited and grounded if the stored electric energy might endanger personnel. If the capacitors or associated equipment is handled in meeting this requirement, the capacitors and associated equipment shall be treated as energized.

(7) Stored nonelectrical energy in devices that could reenergize electric circuit parts shall be blocked or relieved to the extent that the circuit parts cannot be accidentally energized by the devices.

(8) A lock shall be placed on each disconnecting means that is used to de-energize circuits and equipment on which work is to be performed. The lock shall be attached to prevent a person from operating the disconnecting means unless undue force or tools are used.

(9) The requirements of this rule shall be met before any circuits or equipment can be considered to be de-energized and before any circuits or equipment can be worked on. A qualified person shall operate the equipment operating controls or otherwise verify that the equipment cannot be restarted. A qualified person shall use test equipment to test the circuit elements and electrical parts of equipment to which employees will be exposed and shall verify that the circuit elements and equipment parts are de-energized. The test shall also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage backfeed, even though specific parts of the circuit have been de-energized and presumed to be safe. If the circuit to be tested is more than 600 volts, nominal, the test equipment shall be checked for proper operation immediately before and immediately after this test.

(10) All of the following requirements shall be met, in the order presented, before circuits or equipment is reenergized, even temporarily:

- (a) A qualified person shall conduct tests and visual inspections, as necessary, to verify that all tools, electrical jumpers, shorts, grounds, and other such devices have been removed so that the circuits and equipment can be safely energized.
- (b) Employees who are exposed to the hazards associated with reenergizing the circuit or equipment shall be warned to stay clear of circuits and equipment.

- (c) Each lock shall be removed by the employee who applied it or by an employee who is under his or her direct supervision. However, if the employee who applied the lock is absent from the workplace, then the lock, if removed, shall be removed by a qualified person who is designated to perform this task if both of the following provisions are complied with:

- (i) The employer ensures that the employee who applied the lock is not available at the workplace.
- (ii) The employer ensures that the employee who applied the lock is aware that the lock has been removed before he or she resumes work at that workplace.

- (d) There shall be a visual determination that all employees are clear of the circuits and equipment.

#### **R 408.14005. Working on or near exposed energized parts.**

**Rule 4005.** (1) This rule applies to work performed on exposed energized parts that involve either direct contact or contact by means of tools or materials and to work that is performed near enough to energized parts for employees to be exposed to any hazard the parts present.

(2) Only qualified persons may work on electric circuit parts or equipment that have not been de-energized under the procedures specified in R 408.14004. Such persons shall be trained to work safely on energized circuits and shall be familiar with the proper use of all of the following:

- (a) Special precautionary techniques.
- (b) Personal protective equipment.
- (c) Insulating and shielding materials.
- (d) Insulating tools.
- (e) Testing equipment.

(3) If work is to be performed near overhead power lines, the lines shall be de-energized and grounded or other protective measures shall be provided before work is started. If the lines are to be de-energized, arrangements shall be made with the person or organization that operates or controls the electric circuits to de-energize and ground them. If protective measures are provided, such as guarding, isolating, or insulating, these precautions shall prevent an employee from directly contacting such lines with any part of his or her body and from indirect contact through conductive materials, tools, or equipment. The work practices used by qualified persons who install insulating devices on overhead power transmission or distribution lines are not regulated by these rules. Unqualified persons are prohibited from performing this type of work.

(4) When an unqualified person is working in an elevated position near overhead lines, the person shall be located so that the person and the longest conductive object he or she may be using cannot come closer to any unguarded, energized overhead line than the following distances:

- (a) For voltages to ground of 50 kilovolts (kV) or less – 10 feet (ft.) (305 centimeters (cm)).
- (b) For voltages to ground of more than 50 kV – 10 ft. (305 cm), plus 4 inches (in.) (10cm) for every 10kV over 50kV.

(5) When an unqualified person is working on the ground in the vicinity of overhead lines, the person shall not bring any conductive object closer to unguarded, energized overhead lines than the distances specified in subrule (4) of this rule. For voltages that are normally encountered with overhead power lines, objects which do not have an insulating rating for the voltage involved are considered to be conductive.

(6) When a qualified person is working in the vicinity of overhead power lines, whether in an elevated position or on the ground, the person shall not approach, or take any conductive object that does not have an approved insulating handle, closer to exposed energized parts than the distances

shown in table 2, unless 1 of the following provision is complied with:

- (a) The person is insulated from the energized part by utilizing personal protective equipment that is in compliance with the provisions of rule 3387 of Part 33. Personal Protective Equipment, being R 408.13387 of the Michigan Administrative Code.
- (b) The energized part is insulated from all other conductive objects at a different potential and from the person.
- (c) The person is insulated from all conductive objects at a potential that is different from that of the energized part.
- (7) Table 2 reads as follows:

**Table 2**  
**Approach Distance for Qualified Employees**  
**Alternating Current**

Voltage Range (Phase to Phase)	Minimum Approach Distance
300 volts (V) and less .....	Avoid contact
More than 300 V, but not more than 750V .....	1 ft. 0 in. (30.5 cm)
More than 750V, but not more than 2kV .....	1 ft. 6 in. (46 cm)
More than 2kV, but not more than 15kV .....	2 ft. 0 in. (61 cm)
More than 15kV, but not more than 37kV .....	3 ft. 0 in. (91 cm)
More than 37kV, but not more than 87.5kV .....	3 ft. 6 in. (107 cm)
More than 87.5kV, but not more than 121kV .....	4 ft. 0 in. (122 cm)
More than 121kV, but not more than 140 kV .....	4 ft. 6 in. (137 cm)

(8) Any vehicle or mechanical equipment that is capable of having parts of its structure elevated near energized overhead power lines shall be operated so that a clearance of 10 ft. (305 cm) is maintained. If the voltage is more than 50kV, the clearance shall be increased 4 in. (10cm) for every 10kV over that voltage. However, under any of the following conditions, the clearance may be reduced:

- (a) If the vehicle is in transit with its structure lowered, the clearance may be reduced to 4 ft. (122 cm). If the voltage is more than 50kV, the clearance shall be increased 4 in. (10cm) for every 10kV over that voltage.
- (b) If insulating barriers are installed to prevent contact with the lines, and if the barriers rated for the voltage of the line being guarded and are not a part of, or an attachment to, the vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.
- (c) If the equipment is an aerial lift that is insulated for the voltage involved, and if the work is performed by a qualified person, the clearance between the uninsulated portion of the aerial lift and the power line may be reduced to the distance specified in table 2.

(9) An employee who is standing on the ground shall not contact the vehicle or mechanical equipment or any of its attachments, unless either of the following provisions is complied with:

- (a) The employee uses protective equipment that is rated for the voltage.
- (b) The equipment is located so that uninsulated parts of that portion of its structure that provide a conductive path to an employee on the ground cannot come closer to the line than the distances permitted in table 2.

(10) If any vehicle or mechanical equipment that is capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding shall not stand at the grounding location if there is a possibility of overhead line contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous ground potentials, depending on earth resistivity and fault currents, which can develop with the first few feet or more outward from the grounding point.

(11) An employee shall not enter a space that contains exposed energized parts, unless illumination is provided to enable the employee to perform the work safely.

(12) Where lack of illumination or an obstruction precludes the observation of the work to be performed, an employee shall not perform tasks near exposed energized parts. An employee shall not reach blindly into areas which may contain energized parts.

**R 408.14006. Working in confined spaces; conductive materials, equipment, articles; and use of interlocks.**

**Rule 4006.** (1) When an employee works in a confined or enclosed space, such as a manhole or vault, that contains exposed energized parts, the employer shall provide, and the employee shall use, protective shields, protective barriers, or insulating materials as necessary to avoid inadvertent contact with these parts. Doors and hinged panels shall be secured to prevent them from swinging into an employee and causing the employee to contact exposed energized parts.

(2) Conductive materials and equipment that are in contact with any part of an employee's body shall be handled in a manner that will prevent them from contacting exposed energized conductors or circuit parts. If an employee must handle long dimensional conductive objects, such as ducts and pipes, in areas with exposed energized parts, the employer shall institute work practices, such as the use of insulation, guarding, and material handling techniques, which will minimize the hazard.

(3) Portable ladders shall have nonconductive siderails if they are used where an employee or the ladder could contact exposed energized parts.

(4) Conductive articles of jewelry and clothing, such as any of the following, shall not be worn if they might contact exposed energized parts:

- (a) Watchbands.
- (b) Bracelets.
- (c) Rings.
- (d) Key chains.
- (e) Necklaces.
- (f) Metalized aprons.
- (g) Cloth with conductive thread.
- (h) Metal headgear.

However, such articles may be worn if they are rendered nonconductive by covering, wrapping, or other insulating means.

(5) Where energized parts present an electrical contact hazard, an employee shall not perform housekeeping duties at a distance that is close enough to the parts to create the possibility of contact, unless adequate safeguards, such as insulating equipment or barriers, are provided. Electrically conductive cleaning materials, including conductive solids, such as steel wool, metalized cloth, and silicon carbide, and conductive liquid solutions, shall not be used in proximity to energized parts unless procedures are followed which will prevent electrical contact.

(6) Only a qualified person who follows the requirements of R 408.14005 may defeat an electrical safety interlock, and then only temporarily while he or she is working on the equipment. The interlock system shall be returned to its operable condition when work is completed.

**R 408.14007. Use of cord and plug-connected equipment.**

**Rule 4007.** (1) This rule applies to the use of cord and plug-connected equipment, including flexible cord sets (extension cords).

(2) Portable equipment shall be handled in a manner which will not cause damage. Flexible electric cords that are

connected to equipment shall not be used for raising or lowering the equipment. Flexible cords shall not be fastened with staples or otherwise hung in a manner that could damage the outer jacket or insulation.

(3) Portable cord and plug-connected equipment and flexible cord sets (extension cords) shall be visually inspected, before use on any shift, for external defects, such as loose parts, deformed and missing pins, or damage to the outer jacket or insulation, and for evidence of possible internal damage, such as pinched or crushed outer jacket. Cord and plug-connected equipment and flexible cord sets (extension cords) which remain connected once they are put in place and which are not exposed to damage need not be visually inspected until they are relocated.

(4) If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item shall be removed from service and an employee shall not use the item until necessary repairs and tests to render the equipment safe have been made.

(5) When an attachment plug is to be connected to a receptacle, including any on a cord set, the relationship of the plug and receptacle contacts shall first be checked to ensure that they are of proper mating configurations.

(6) A flexible cord that is used with grounding-type equipment shall contain an equipment-grounding conductor.

(7) Attachment plugs and receptacles shall not be connected or altered in a manner that would prevent proper continuity of the equipment grounding conductor at the point where plugs are attached to receptacles. Additionally, attachment plugs and receptacles shall not be altered to allow the grounding pole of a plug to be inserted into slots that are intended for connection to the current-carrying conductors.

(8) Adapters that interrupt the continuity of the equipment-grounding connection shall not be used.

(9) Portable electric equipment and flexible cords that are used in highly conductive work locations, such as those inundated with water or other conductive liquids, or that are used in job locations where employees are likely to contact water or conductive liquids shall be approved for those locations.

(10) An employee's hands shall not be wet when plugging and unplugging flexible cords and cord and plug-connected equipment if energized equipment is involved.

(11) Energized plug and receptacle connections shall be handled only with insulating protective equipment if the condition of the connection could provide a conducting path to the employee's hand. For example, if a cord connector is wet from being immersed in water.

(12) Locking-type connectors shall be properly secured after connection.

#### **R 408.14008. Electric power and lighting circuits.**

**Rule 4008.** (1) Load-rated switches, circuit breakers, or other devices specifically designed as disconnecting means shall be used for the opening, reversing, or closing of circuits under load conditions. Cable connectors that are not of the load-break type, fuses, terminal lugs, and cable splice connections shall not be used for such purposes, except in a emergency.

(2) After a circuit is de-energized by a circuit protective device, the circuit shall not be manually reenergized until it has been determined that the equipment and circuit can be safely energized. The repetitive manual reclosing of circuit breakers or the reenergizing of circuits through replaced fuses is prohibited. When it can be determined from the design of the circuit and the overcurrent devices involved that the automatic operation of a device was caused by an over load rather than a fault condition, an examination of the circuit or connected equipment is not needed before the circuit is reenergized.

(3) Overcurrent protection of circuits and conductors shall not be modified, even on a temporary basis, beyond that permitted pursuant to the provisions of 29 C.F.R. §1910.304(e), which are the installation safety requirements for overcurrent protection and which are adopted by reference in these rules in R 408.14002.

(4) Only a qualified person shall perform testing work on electric circuits or equipment.

(5) Test instruments and equipment and all associated test leads, cables, power cords, probes, and connectors shall be visually inspected for external defects and damage before the instruments and equipment are used. If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item shall be removed from service, and an employee shall not use the item until necessary repairs and tests to render the equipment safe have been made.

(6) Test instruments and equipment and their accessories shall be rated for the circuits and equipment to which they will be connected and shall be designed for the environment in which they will be used.

(7) Where flammable materials are present only occasionally, electric equipment that is capable of igniting the materials shall not be used, unless measures are taken to prevent hazardous conditions from developing. Such materials include flammable gases, vapors, or liquids, combustible dust, and ignitable fibers or flyings. Electrical installation requirements for locations where flammable materials are present on a regular basis are contained in the provisions of 29 C.F.R. §1910.307, which are adopted by reference in these rules in R 408.14002.

#### **R 408.14009. Safeguards for personnel working in electrical hazard areas.**

**Rule 4009.** (1) An employee who works in an area where there are recognized electrical hazards shall be provided with, and shall use, electrical protective equipment that is appropriate for the specific parts of the body to be protected and for the work to be performed. The appropriateness of the protective equipment shall be determined pursuant to the provisions of general industry safety standard, Part 33. Personal Protective Equipment, being R 408.13301 et seq. of the Michigan Administrative Code.

(2) Protective equipment shall be maintained in a safe, reliable condition and shall be periodically inspected or tested, as required by the provisions of general industry safety standard, Part 33. Personal Protective Equipment, being R 408.13301 et seq. of the Michigan Administrative Code.

(3) If the insulating capability of protective equipment may be subject to damage during use, the insulating material shall be protected. For example, an outer covering of leather is sometimes used for the protection of rubber insulating material.

(4) An employee shall wear nonconductive head protection pursuant to the provisions of R 408.13370 and R 408.13378 if there is a danger of head injury from electric shock or burns due to contact with exposed energized parts.

(5) An employee shall wear protective equipment for the eyes or face if there is a danger of injury to the eyes or face from electric arcs or flashes or from flying objects that result from electrical explosion.

(6) When working near exposed energized conductors or circuit parts, each employee shall use insulated tools or handling equipment if the tools or handling equipment might make contact with the conductors or parts. If the insulating capability of insulated tools or handling equipment is subject to damage, the insulating material shall be protected.

(7) Fuse-handling equipment that is insulated for the circuit voltage shall be used to remove or install fuses when the fuse terminals are energized.

(8) Ropes and handlines that are used near exposed energized parts shall be nonconductive.

(9) Protective shields, protective barriers, or insulating materials shall be used to protect each employee from shock, burns, or other electrically related injuries while that employee is working near exposed energized parts which might be accidentally contacted or where dangerous electric heating or arcing might occur. When normally enclosed energized parts are exposed for maintenance or repair, they shall be guarded to protect unqualified persons from contact with the energized parts.

(10) The following alerting techniques shall be used to warn and protect employees from hazards which could cause injury due to electric shock, burns, or the failure of electric equipment parts:

- (a) Safety signs, safety symbols, or accident prevention tags shall be used where necessary to warn employees about electrical hazards which may endanger them, as required by the provisions of Part 37. Accident Prevention Signs and Tags, being R 408.13701 et seq. of the Michigan Administrative Code.
- (b) Barricades shall be used in conjunction with safety signs where it is necessary to prevent or limit employee access to work areas that expose employees to uninsulated energized conductors or circuit parts. Conductive barricades shall not be used where they might cause an electrical contact hazard.
- (c) If signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant shall be stationed to warn and protect employees.